JUNE 1974

THE HORN SPEAKER

Seat of a Famous 1901 Wireless Experiment

It was in this tower that the first wireless signals (the letter "S" in quick succession) were received across the Atlantic. Photograph, posed just after the completion of the test, shows Marconi, standing on the steps of the tower with his two assistants, Messrs. Paget and Kemp; tower keeper at lower right

RADIO NEWS FOR JANUARY, 1932

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VOL. III, NO. 6 June 1974 Monthly except during July and August Price $3.00 yearly Single Issue 50¢ Publisher, Jim Cranshaw

Second-class postage paid at Dallas, Texas Office Address: 9820 Silver Meadow Drive, Dallas, Texas 75217 214-286-1673

THE NEWSPAPER FOR
THE HOBBYIST OF VINTAGE
ELECTRONICS AND SOUND

THE HORN SPEAKER

ANNUAL PICNIC BUCKEYE CLUB, August 4

The Buckeye Antique Radio and Phonograph Collector's Club will picnic at Ken Spriggel's residence, Uniontown, Ohio.

A MAJESTIC *Miracle*

Majestic Did a $70,000,000 Business Last Year with a Daily Production of 5,000 Complete Receivers

ROMANCE — speed — and more speed — fancies made facts almost overnight. A $5,000,000 business in 1927, $40,000,000 in 1928 and $70,000,000 in 1929. Expansion in production so rapid as to take one's breath away. Such is an impressionistic picture of what goes on in the plant of Grigsby-Grunow Company, Chicago, manufacturers of the Majestic radio.

The remarkable things this concern has done, and is doing, can be epitomized in a sentence. Each day materials for one day's production are received at the front door, and each night the day's production is on its way to thousands of dealers. Not a square foot of storage for finished sets. Every month's production is increasing and it is now assured that the Grigsby-Grunow Company, by September 1, 1930, will be producing 7,000 sets daily.

Specific policies and methods have been followed in stepping the production up to 5,000 radio sets—over three-quarter million dollars' worth—per day in the plants of a seven-year-old radio parts manufacturing company that a year and a half ago had never made a complete radio set in its corporate life. This story is not about radio manufacturing. Instead, its subject is: Speedy Industrial Expansion.

Steady mass production, evidently planned in advance with extreme care, checked hourly in each department, with inspectors and testers at hundreds of different stages in the making of each radio set, is the Grigsby-Grunow method. There are 13,000 employees, 1,300 inspectors and each Majestic represents 992 inspections.

Material flows through the eight plants in a steady stream, speedily—but not hurriedly. In the first two the radio set itself is made; in the next five, the cabinet, the speaker, while in the eighth 6,000 tubes are turned out daily.

There are no warehouses, and only a few relatively small stock rooms. In some cases material comes into the shops and within two hours is loaded on cars again in the form of completed radios, boxed for shipment. Practically no item is kept in an unfinished state more than two days.

About thirty-seven carloads of raw materials arrive daily. There is a standing order for forty empty box cars a day, to be switched in, ten at a time, into which radios are loaded the moment they are completed.

To build 5,000 complete radio receivers in an eight-hour working day is in itself a tremendous accomplishment. To build these same receivers at this great speed and with no sacrifice of quality is even a greater accomplishment.

(Top) Chassis assembly lines in the Grigsby-Grunow factory. (Above) Machines operated by girls turn out 20,000 cabinet legs each working day. (Below, left) Final assembly in the cabinet factory said to be the largest furniture plant in the world. (Below) Coil-winding machines consume a large portion of the 60,000 miles of wire which goes into each day's production

RADIO NEWS FOR MAY, 1930

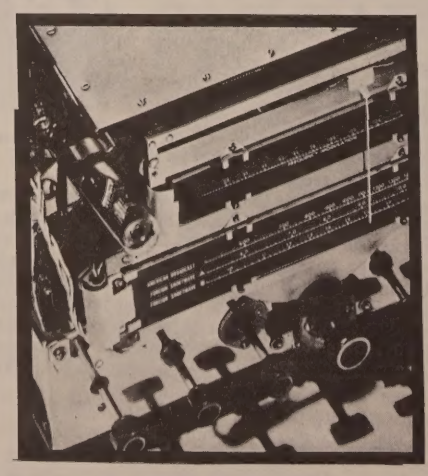
"IN CONJUNCTION," AWA and IHRS

The Indiana Historical Radio Society in conjunction with the Antique Wireless Association was scheduled for a summer meet on June 22, 1974, at the Stewart Center, Purdue University, West Lafayette, Indiana.

The Classic Radio

BY J. W. F. PUETT

THE MOST ELUSIVE SCOTT OF ALL is probably not the "Special" communications receiver produced in 1941 or even the 40-tube Quaranta of 1936. In December of 1945, a letter entitled News From the Laboratories announced "a choice of three basic editions." Each "basic chassis design" was to incorporate the "new permanent FM band" (88 to 108 MHz). The lowest priced Scott announced was the type 500, scheduled for delivery in March of 1946. The "medium priced set" was the type 800 which was to be ready for delivery in January of 1946. Most classic collectors are familiar with the 500 and 800 series, but in this same letter, "the most costly Scott, a deluxe limited edition, the Scott 1500" was announced. Although the 1500 may never have been manufactured for market to the general public, this set was to be completed "during the summer of 1946". There are rumors that at least one Scott 1500 exists today. The Scott advertisement in the January 1946 issue of the National Geographic Magazine contains a photograph of a very elaborate tuner chassis. Could this be the rare Scott 1500? The tuner in the photo has a separate FM band, the AM broadcast band, and two short wave bands. The type 800 had only one short wave band. I would certainly like to correspond with anyone who can furnish additional information on the Scott 1500. J. W. F. Puett, 3008 Abston Drive, Mesquite, Texas 75149. Our thanks to Mr. Joe Halser for furnishing the information for this article. Watch for a detailed biographical sketch on E. H. Scott in the September issue of THE HORN SPEAKER.



Television Receiver Kit

Easily Assembled at Home

This television receiver kit was designed to simplify the problem of home construction. The finished job combines the appearance of a manufactured chassis with the efficiency of good engineering

By D. E. Replogle*

ARE you telewise? If not, you are missing much profitable entertainment. Television is no longer an experimental mystery, there being a number of powerful stations broadcasting regular features that are picked up by thousands of amateurs who have built their own receiving equipment. W2XCR of New York, W2XCD of Passaic, N. J., and W3XK of Washington, D. C., for instance, broadcast continuous programs from three in the afternoon until a half hour after midnight each day in the week with the exception of the hour from five to six. Other stations located in Boston, Long Island City, Chicago and on the West Coast also have regular program services. All types of entertainment are being featured by these stations; playlets, dancers, important speakers, singers. The voice part of these broadcasts can be picked up by the average good broadcast receiver but in order to pick up the images a special short wave receiver and radiovisor must be employed.

The Federal Radio Commission has designated a special band for television broadcasting, in the range between 100 and 150 meters. As there are fewer television stations per channel in this band than radio stations in their band, the signals are easily picked up without interference. Unfortunately few of the short wave broadcast receivers on the market are suited for television reception. Broadcast receivers are rarely designed to go below 200 meters and most of the efficient short wave sets are designed to operate in the more popular 3000, 7000, and 14,000 kc. bands.

In order to enjoy television programs two pieces of apparatus are required: a short wave television receiver, and a radiovisor. The receiver is similar in design to those used for regular short wave radio reception with certain reservations to be dealt with later. The radiovisor takes the place of the loud speaker in the usual outfit. In this particular article we shall interest ourselves only with the construction of the receiver proper, dealing with the radiovisor later. That article, together with the present one, will cover complete home television equipment.

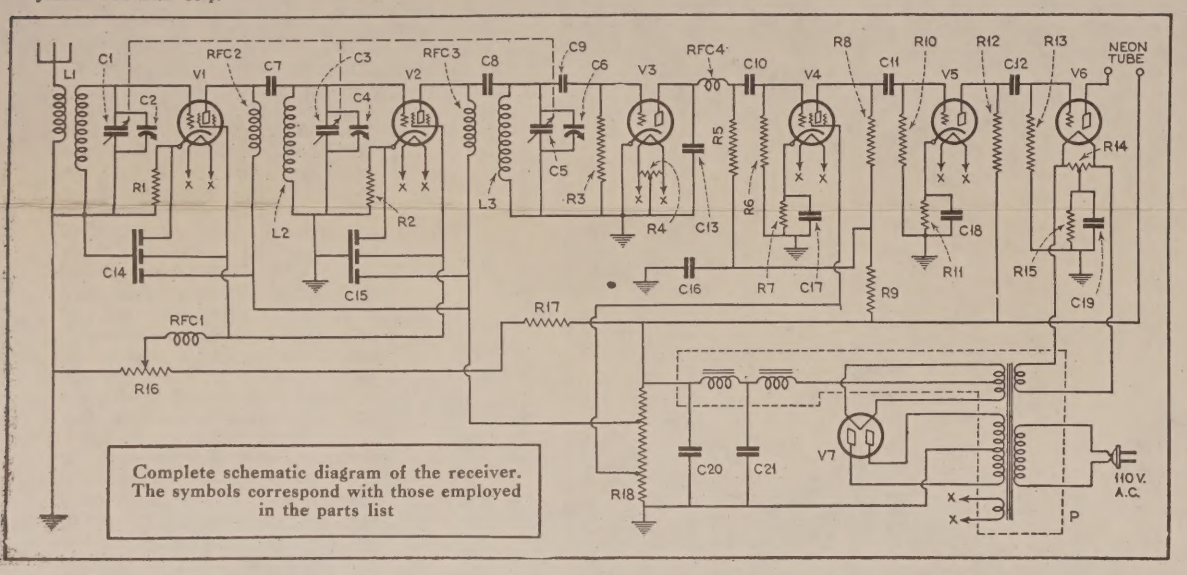
A television receiver kit has been designed by the Jenkins Corporation of Passaic, N. J., which answers the requirements of a good television receiver. The kit includes the complete parts for the receiver, power pack and amplifier. The parts and circuit are especially designed to eliminate distortion. A resistance coupled amplifier has been used, as the best transformer coupled amplifiers cannot cover the frequency range necessary for the detail and shading of radio pictures.

If the experimenter possesses a receiving set that covers a range of 100 to 150 meters, employs a resistance amplifier, a stage of power amplification which employs the type –45 tube, a system of tuning that can easily tune out undesired stations, and sufficient sensitivity to pick up with ample strength the signals from one or more of the television stations now operating, he need only construct the radiovisor in order to procure television programs.

The receiver while designed especially for the Jenkins radiovisor may be used with other standard radiovisors as well. Its price is well within the range of any fan. The assembled set resembles the usual six tube single control short wave set. The power pack, operating with a type –80 full wave rectifying tube, is located in the rear of the set. A tuned radio frequency amplifier with two stages of radio frequency is employed, followed by a detector, two stages of audio frequency and a stage of power amplification. The carefully filtered power pack output supplies all the necessary A, B, and C voltages for the set. Each part in the kit has been numbered for easy identification. With the aid of clear charts and simple instructions the receiver can be assembled in a few hours. Every part is included in the kit so that not even a bolt or piece of wire need be purchased.

The first unit to be considered is the power pack, which in the assembled set will be located in the rear of the receiver.

*Jenkins Television Corp.



Complete schematic diagram of the receiver. The symbols correspond with those employed in the parts list

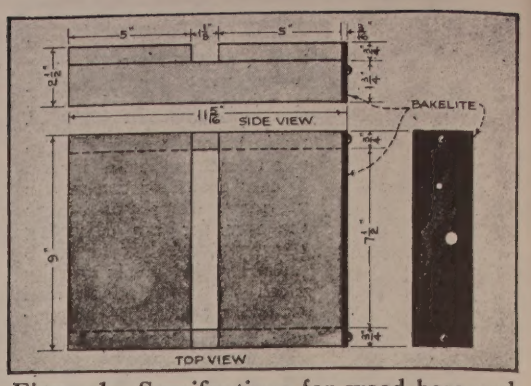


Figure 1. Specifications for wood base and bakelite control panel

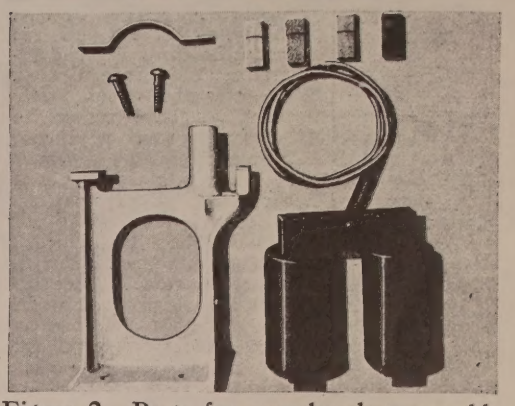


Figure 2. Parts for rear bracket assembly

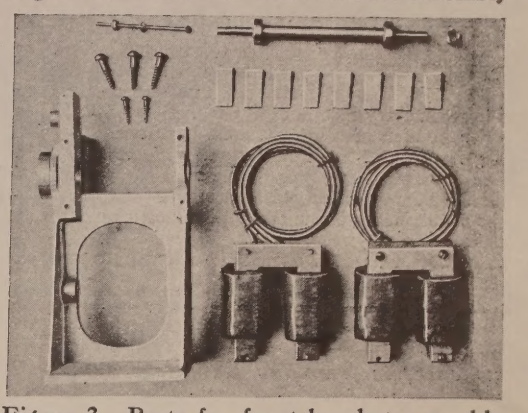


Figure 3. Parts for front bracket assembly

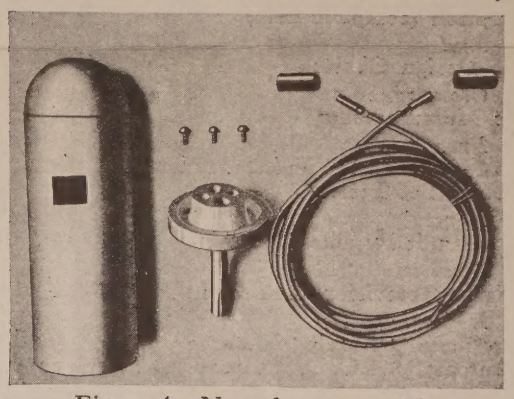


Figure 4. Neon lamp assembly

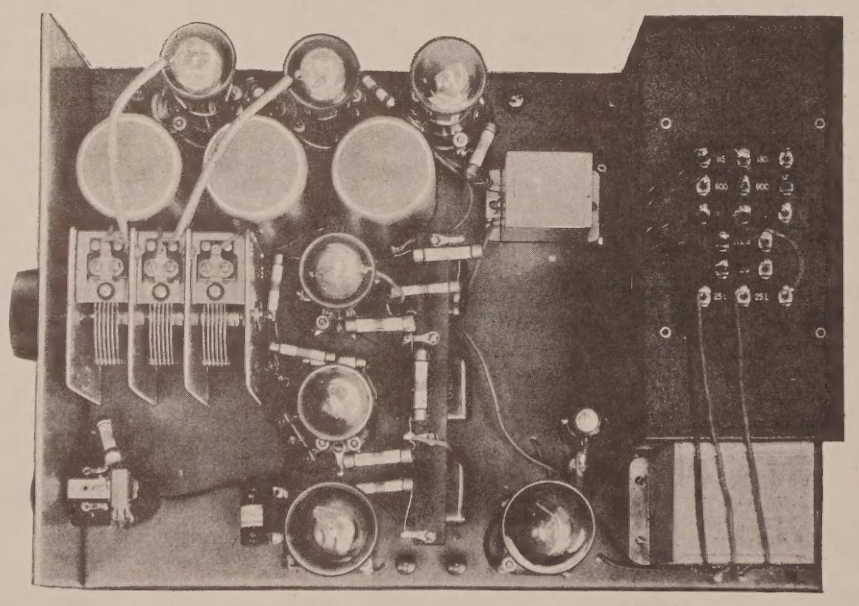
This pack includes a special transformer supplying 2.5 volts and 5.0 volts to the audion filaments, as well as 300 volts to each plate of the rectifier tube. The rectified high voltage is filtered by means of two special 30 henry chokes, enclosed in the transformer housing for simplicity, and a 6 mfd. condenser block. This unit supplies all the power required to operate the receiver and is turned on and off by a switch mounted on the volume control knob on the front panel of the receiver.

The second unit is a radio frequency amplifier and station selector, located on the front portion of the base immediately behind the front panel. This unit consists of two screen-grid tubes operating in three tuned circuits. Tuning is accomplished by means of a single knob that controls the three gang variable condenser.

The three tuned circuits provide ample selectivity, while the two screen-grid tubes amplify the signal sufficiently to provide good pictures when the received wave has a field strength as low as 15 microvolts per meter. Were the receiver more sensitive it would pick up static and other electrical noises to distort the picture when the strength of the received signal drops below 15 microvolts per meter. The radio-frequency amplifier is designed to pass the wide frequency band which is absolutely essential to good television image reception.

The third unit consists of three stages of resistance coupled amplification. The first stage employs a screen-grid audion, and the second the usual three element audion. The third and last stage uses a type –45 audion. This stage provides the power to operate the neon tube of the radiovisor.

The kit contains a base with all holes for mounting drilled. All supports for coils, condensers, tubes, etc., are complete in every detail. Almost every piece of apparatus is fastened on with lock washers so that there is little chance of any of the equipment being jarred loose.



Assembled Jenkins television receiver, showing locations of all parts

List of Parts

1 power pack, P
1 filter condenser 4.0-2.0 mfd., C20, C21
1 plate by-pass condenser 1.0 mfd., C16
3 audio coupling condensers 0.25 mfd.. C10, C11, C12
2 RF coupling condensers .0001 mfd., C7, C8
1 grid condenser .0001 mfd., C9
1 detector by-pass condenser .0001 mfd., C13
3 grid bias by-pass condensers 2.0 mfd., C17, C18, C19
2 RF by-pass condensers 0.1 mfd., C14, C15
1 variable tuning condenser gang, C1 to C6 inclusive
1 bleeder resistor 41,000 ohms tapped, R18
2 hum balance resistors 20 ohm center tapped, R4, R5
3 Coupling resistors 250,000 ohms, R6, R10, R13
3 coupling resistors 100,000 ohms, R3, R5, R17
2 coupling resistors 50,000 ohms, R8, R12
1 coupling resistor 25,000 ohms, R9
1 bias resistor for type –45 tube 2,000 ohms, R15
1 bias resistor for type –27 tube 2,000 ohms, R11
3 bias resistors for type –24 tube 500 ohms, R1, R2, R7
1 volume control resistor 25,000 ohms, R16
1 RF choke 300 turns, RFC1
3 RF coupling coils, RFC2, RFC3, RFC4
1 antenna coil, L1
2 RF coils, L2, L3
5 five-prong audion sockets, V1 to V5, inclusive
2 four-prong audion sockets, V6, V7
1 tuning dial.

Besides the above listed major parts, the kit contains the accessories, such as wire, nuts, insulating mounts, clips, etc.

Mounting of the Parts

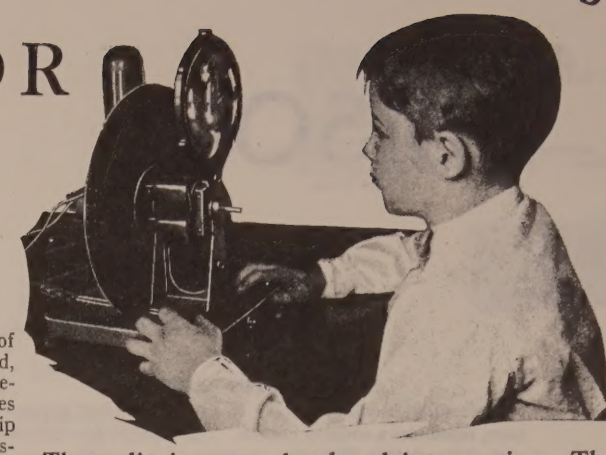
In designing the set the engineers have taken great care that the apparatus is mounted so as to give the greatest facility in wiring and the minimum of induced currents in the set.

First the three grid by-pass condensers, C10, C11 and C12, should be mounted in the proper places, next the two four-prong tube sockets on the right hand side of the base panel. The five five-prong sockets are then mounted, three on the left hand side of the baseboard going back and two just back of where the gang condenser is to be placed. The bleeder resistor, R18, should now be placed with great care. The front panel should then be anchored to the base. The two RF coils and the antenna coil, with their accompanying "cans," should be fastened down. The gang condenser is fastened directly on the chassis with the proper screws. It should be noted that the

Building a RADIOVISOR

A simple and inexpensive radiovisor which serves as a fitting mate for the television receiver described last month

By D. E. Replogle*



The radiovisor completed and in operation. The model shown here differs from the one described only in the use of a metal base instead of wood

IT is the duty of the radiovisor to convert the received radio impulses of the television transmitter into visual images as it is the duty of the loud speaker to convert the radio impulses of the sound transmitter into sound. Last month we discussed the construction of the receiver proper for a television receiving installation. In this article we will discuss the radiovisor.

As is also true of loud speakers, there are many types of radiovisors, most of them operating on the same general principle. If the reader has constructed the short-wave receiver described last month, no doubt he is eager to add the radiovisor equipment so that he may look in on the programs listed in the daily papers. If Mr. Setbuilder has not the patience to assemble his own radiovisor from the kit of parts described here, he may purchase the complete equipment either in an attractive walnut cabinet or without one. Although this article is written especially for the home assembler, the purchaser of factory-assembled equipment will find the following instructions useful for the operation of his radiovisor.

How the Radiovisor Works

Essentially, the radiovisor consists of a neon lamp, a scanning disc driven by a motor and a lens which magnifies the image. To this may be added the self-synchronizer, a device which automatically keeps the scanning disc of the receiver in step with that of the transmitter. The neon lamp glows bright and dim in accordance with the modulation or variation of the incoming signal, the shadows appearing dark, the highlights light. The glowing neon lamp is seen through the minute holes arranged in a spiral around the edge of the disc. Only a single dot of light appears at a time, corresponding to one hole of the disc, but as the disc revolves, the dot of light takes the form of a horizontal line. Then the next hole appears, taking the shape of another line directly below the first one. The speed with which the disc revolves and the persistence of vision make it appear that all the 60 lines, equivalent to the 60 holes in the disc, are seen at once in a solid frame of light. The scanning disc is revolving in exact step or synchronism with the transmitting scanner.

The Jenkins Television Corporation manufactures three distinct types of radiovisors, to meet the three different classes of buyers. The cabinet model with scanning drum (instead of a disc) and automatic synchronizer has been designed for living room use. The completely assembled radiovisor without cabinet will receive the programs perfectly, while its parts are accessible for changes and additions in keeping with the advance of the art. The radiovisor kit resembles the second model when assembled, but is designed especially for those who wish to build their own radiovisors at the lowest possible cost. Let us assemble one of these kits.

*Jenkins Television Corp.

Beginning with the platform or base, cut two blocks of white pine, maple or other wood that can be readily worked, each measuring ¾ x 5 x 9 inches. The pieces should be carefully planed and perfectly square. Then cut two more pieces measuring ¾ x 1¾ x 11⅛ inches each. Next a bakelite strip should be cut, measuring 2½ x 9 x 3/16 inches and the necessary holes drilled as indicated in Figure 1, which also shows the wood strips of the base.

Assemble the platform by placing the smaller wood strips on edge and bridging the larger blocks across them, allowing a space of 1⅛ inches between the larger blocks of wood. The pieces should be accurately and neatly fitted and nailed in place. The bakelite strip is now placed across one end, screwed to the end of the wood strip to form the control panel as shown in the completed assembly views of the radiovisor.

The template supplied with the kit is now placed on the base with the edge marked front facing the control panel. The proper holes have already been marked on the template which fits neatly to the edge of the wooden base. The holes as indicated on the template should be drilled through the wooden base. The platform is now ready for wiring.

Assembling the Parts

Figure 2 shows the components of the rear bracket assembly; the rear bracket, the rear electromagnet, the coil wedges and the rotor guard. The first step in the assembly of the rear bracket is to place the bracket upright on a table. The rear electromagnet is placed on top of the bracket with open end of magnet straddling the center post of the bracket. Next place the rotor guard on top of and across the open end of the magnet core. Align its holes with those of the pole piece and bracket, and slip through screws and tighten. Tighten the remaining magnet screw. Each coil should be pushed back as far as possible against the cross piece of the core. The wedges are then carefully inserted in the inside of the core, one facing the side of the coils, another facing the top of the coil. This precaution prevents noise when the radiovisor is in operation.

The assembly of the front bracket follows next. Figure 3 shows the parts of the front bracket: front magnets, front brackets, rotor spacer, shaft assembly, coil wedges, bearing clamping screws and the necessary screws and nuts for the assembly.

To begin assembly, place the front bracket on its base, upright, on the table. Place on electromagnet against one side, noting that the open end straddles the rounded bearing holder of the bracket. Keep wires or leads outside. Drive home screws that hold the magnet in position. Do likewise with the other electromagnet. Push the coils as far back as possible against the cross member of the magnet core and drive in wedges to hold coils tightly. Insert the rounded end of shaft and bearing through that end of the front bracket that is slotted through to the bearing hole. Push the shaft assembly as far as it will go, so that the ball bearing nearest the rounded end fits snugly in the boss at the far end of the bracket. If preferred, the shaft assembly may be put in place before assembling the coils on the front bracket. The ball bearings should be flush at both ends of the bracket. Draw up tightly and screw through the empty holes in the cores which are aligned with holes in the slotted bracket arm. Apply lock washer and screw. It is very important that the shaft be free enough to be spun with the thumb and first finger.

The Neon Lamp and Scanning Disc

Figure 4 shows the parts that are to be used in the neon lamp house assembly, consisting of the lamp shield, the base of the lamp shield, the lamp shield screws, the prong jack sleeves for establishing contact with the neon lamp prongs and the rubber-covered leads. The three felt cushions supplied should be cemented to the inside of the lamp house. The cushions prevent chatter due to the neon lamp vibrating against the lamp house. To assemble the lamp house simply place the neon lamp in the socket with the (*Continued on page* 233)

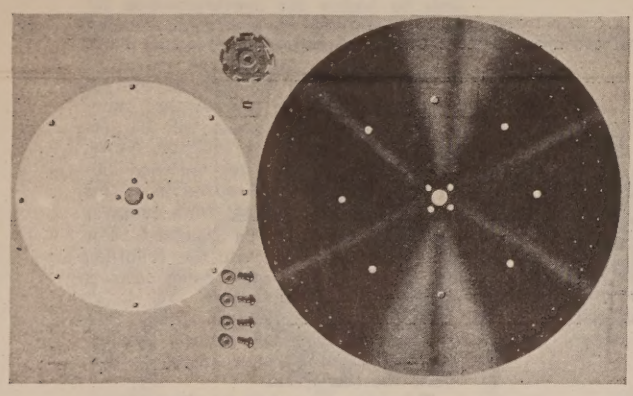


Figure 5. Scanning disc parts

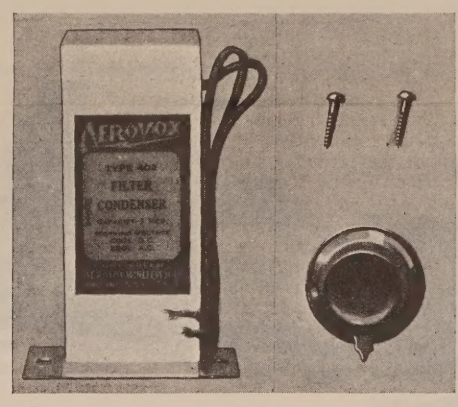


Figure 6. Control panel parts. Switch may be added if desired.

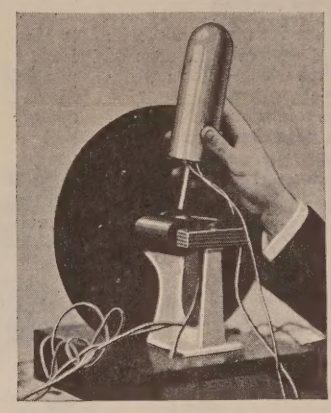


Figure 7. Method of mounting neon lamp

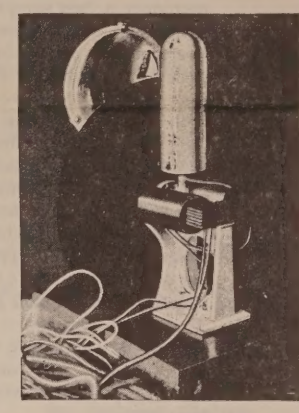


Figure 8. Rear view of completed radiovisor

shaft of the condenser should be carefully insulated from the panel. The trimmer condensers on the gang condenser unit should be uppermost so that they will be freely accessible. The entire power pack should be placed at the rear of the baseboard. Binding posts for the antenna and ground should be located in the holes provided near the panel end of the baseboard. The binding posts for the loud speaker or radiovisor should be located on the opposite side of the baseboard near the output audio stage.

Wiring the Set

The parts having been mounted, we are now ready for wiring. The Jenkins kit calls for long leads to run through holes and under the base panel, but this is optional. The components have already been arranged so that they are in the best relative positions for close wiring. The theory of the straight line is the best one to follow in any wiring job. Many short wave broadcast and amateur enthusiasts operate with hay wire outfits but good television results cannot be expected with hay wire methods. A list of don'ts that every set builder should follow:

Don't make wires or leads longer than necessary.

When connecting leads to binding posts don't leave ends dangling over.

Don't leave great hunks of solder on leads.

Don't solder connections without first scraping the parts to be soldered.

Don't splice a broken lead; use a new one.

The above don'ts are an old story to the experienced amateur set builder and are followed closely by the best of them, but they cannot be repeated too often.

For the convenience of the builder all cathode wires have been made yellow, grid wires green, plate wires red, and all other wires black. First the complete filament is wired according to the diagram. When this is completed plug the audions in their proper sockets and connect the receiver to the electric lighting current. When the switch is turned on the audion filaments should light up showing that the wiring has been done properly. Next the grid circuit should be wired, followed by the plate and cathode circuits.

Figure 5 shows the components of the scanning disc assembly, consisting of the scanning disc, rotor, copper hub flange and screws.

To assemble the sixty line scanning disc, hold the black disc in the left hand with the side of the disc facing the assembler which shows the spiral of tiny holes running clock-wise towards the center. Place copper hub flange at the back of disc, aligning its holes with those in the back of the disc. Drive home screws. Place rotor on side facing the assembler, align holes with those on center of disc and insert flat headed screws in rotor, through disc and copper hub flange, slipping nuts on rear side and drawing up tightly. The sixty line disc assembly is now complete.

Place the shield over the lamp, with window or opening aligned with plate of lamp. Align screw holes of shield with those of lamp socket member, insert screws and tighten. The lamp house is now complete.

The components of the motor controls can be clearly seen in Figure 6. These consist of rheostat, fixed condenser and the screws to hold the latter in place. These parts are mounted on the under side of the platform or base. A small toggle switch, such as is employed for the usual socket power radio set, is desirable but not essential for the starting and stopping of the motor. Mount the condenser on the under side of the platform, under the wood block adjacent to the bakelite panel, screwing the condenser to the left-hand upright board. The rheostat is mounted in the 13/32 inch hole on the right side as viewed from the front of the panel. The switch, if employed, is mounted in the 9/16 or middle hole intended for that purpose.

Mounting the Components

The major components of the radiovisor have now been assembled and are ready for mounting on the platform. First the front bracket is mounted, with the rounded end of the scanning disc shaft facing the front or panel end of the platform. It will be noted that small holes already drilled in the platform precisely align with the three small holes in the bracket base, while the large-hole aligns with the larger hole in the platform for the passing through of certain wires.

Next, the scanning disc is mounted on the shaft protruding from the rear of the front bracket. The rotor spacer is slipped over the square end of the shaft and pushed back against the ball bearing. Then the scanning disc is slipped over the shaft and pushed back against the spacer, after which the set screw in the rotor is tightened.

The rear bracket is now placed on the platform and so positioned that its holes align with the holes already drilled in the platform. The pole pieces and rotor guard should now surround the motor. The screws are driven home through the bracket base into the wooden platform. The scanning disc should be twirled to make certain that it turns free and that the rotor does not rub against the coils or the core of the rear magnet. About 3/16 inch is the proper distance between the front of the scanning disc assembly and the ends of the front magnet. The rear magnet core and back of scanning disc are about 3/16 inch apart.

The lamp housing shown in Figure 7 is mounted on the rear bracket by inserting the long pin of the lamp socket in the hole in the center post. The pin or protruding portion of the lamp socket permits raising or lowering of the lamp, or turning it from side to side, in order to frame the picture.

The magnifying lens assembly, as shown on the finished radiovisor, does not come with the kit but can be purchased separately and easily put on the front of the radiovisor by placing the lens in its holder and screwing the assembly onto the front of the radiovisor.

The wiring of the radiovisor is very simple, provided the wiring diagram which accompanies the kit is followed precisely. The leads have been colored for convenient identification.

EDISON

Scientific American.

JULY 13, 1878.

AN HOUR WITH EDISON.

Professor Edison's laboratory, in size and external appearance, resembles a country church. The interior, however, is not so church-like. The first apartment is a reception room, on the right of which is the private office, containing a large library of scientific works. Beyond these there is a large room containing materials and a number of glass cases filled with expensive physical and chemical apparatus. The machine shop at the rear is furnished with the best of machinery and tools, and is kept constantly in operation in carrying out the plans of Mr. Edison. On the second floor there is a single spacious room, which is the laboratory proper. Here, upon the walls, are shelves which are thickly studded with bottles, jars, and boxes, containing all known substances, both common and rare. It is a chronic habit of Mr. Edison to purchase every newly discovered substance, so that it will be at hand should it be required. The Professor states that no substance can be named that is not included in his collection.

In the middle of the floor there is a stand containing a great number of batteries, from which wires run in all directions. Beyond is a table upon which, among other pieces of apparatus, there is a large induction coil, capable of yielding a spark 12 or 14 inches in length. Here also is the carbon relay, the progenitor of all existing carbon telephones, "microphones," and other instruments dependent on the changeable conductivity of carbon under a varying pressure.

No one can pass by the phonograph, and the Professor himself does not tire in experimenting with this wonderful machine.

One phonographically cultivated can no longer be satisfied with "Mary had a little lamb" and selections from Mother Goose, for now the phonograph can sing, and not only a simple melody, but a duet, and even furnish you with an accompaniment and applause at the same time.

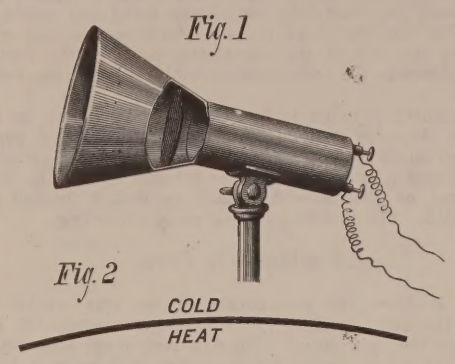
The phonograph which Mr. Edison uses in his laboratory has a double mouth-piece, and the machine will faithfully reproduce a duet sung in it; but the most interesting performance is to hear the Professor sing a duet alone. Singing first the air of "John Brown's body," etc., and afterward the bass over the same matrix while listening to the air as reproduced by the instrument, he produces a matrix which will sing both treble and bass. Not satisfied with this, he whistles Yankee Doodle, and finally, over the same matrix, talks in a loud voice, so that when the whole is reproduced we have a first-class street corner bawl, which is like this: Two fellows singing John Brown, another whistling Yankee Doodle, and a perturbed citizen crying from an upper window, "O shut up! Go away! If you can't sing better than that the police will arrest you! Police! police!"

In the extreme rear end of the laboratory, among a host of funnels, jars, acoustic and pneumatic apparatus, there are telephone wires, with which are connected a carbon transmitting telephone and a receiving instrument. Standing some 8 or 10 feet from the transmitter, Mr. Edison said, in an ordinary tone of voice, "Do you take the SCIENTIFIC AMERICAN?" Answer from the other end of the line. "I do." Q. "What do you pay for it?" A. "Three dollars and twenty cents a year." Q. "What is your opinion of it?" A. "It is the best of its kind." Q. (while crumpling a paper) "What am I doing now?" A. "Crumpling a paper." Then followed music from a music box of the smallest size, and other tests, showing the wonderful perfection and power of the instrument.

The thermo-telephone, explained by the Professor, although at present without special practical value, is certainly a novelty. It consists of a thermopile having placed in its collecting funnel a hard rubber disk, as shown in the first engraving. A sound made in front of this disk is heard in a receiving telephone connected with the thermopile.

The *rationale* of this is at once apparent when a strip of hard rubber is placed against the lips and bent, as shown in the second engraving, so that the strip will be alternately concave and convex. The difference in temperature is very perceptible, the convex surface being cold and the concave surface warm, and, however rapid the vibrations which render the surfaces alternately convex and concave, the result is the same.

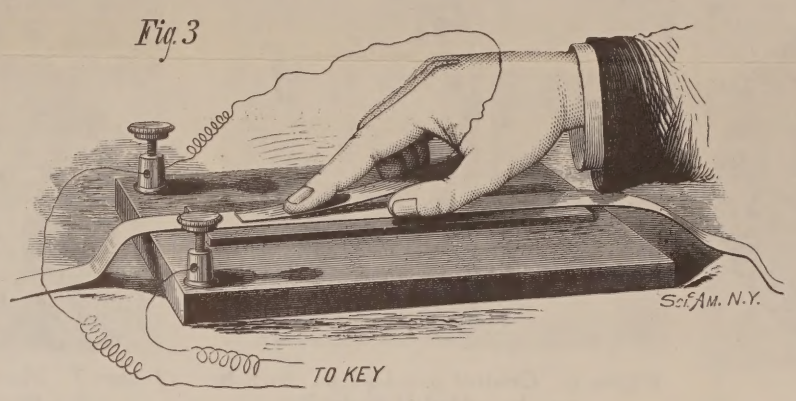
We witnessed an experiment illustrative of the principle of Mr. Edison's electro-motograph, a telegraphic instrument in which the sounder is operated without magnets. In this experiment, which is illustrated in Fig. 3, a strip of chemically prepared paper is laid upon a metallic surface, which is connected with one of the battery wires, and a platinum faced spring which is attached to the other battery wire is taken in the hand and pressed firmly on the paper strip; at the same time force is applied in the direction of the length of the strip. A telegraph key is placed in the electric circuit, and when the current passes through the paper the salt contained by it is instantly decomposed, so that it acts as a lubricant, permitting the spring to slide easily on the paper while the current passes, but immediately the current is broken the friction is sufficient to stop the spring.



THERMO-TELEPHONE.

The best solution for saturating the paper is made by dissolving 1 lb. of sulph. soda in 1 gallon of water. Any of the sodium salts will answer.

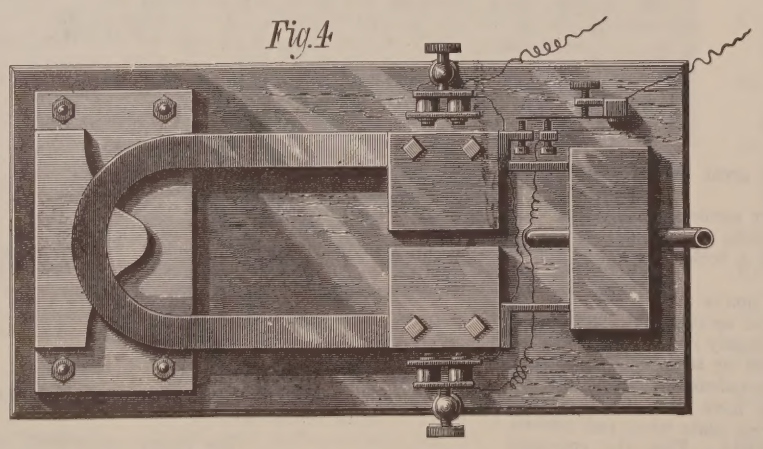
Electricity as a motive power, until now, has been a comparative failure, as 90 per cent of the battery has been wasted. Professor Edison has devised a novel electrical machine which he calls the Harmonic Engine, in which 90 per cent of the power is realized. With two small electro-magnets and three or four small battery cells, sufficient power is generated to drive a sewing machine or pump water for household purposes.



ELECTRO-MOTOGRAPH.

This engine, which is represented in Fig. 4, consists of a fork 2½ feet long, made of 2 inch square steel. The curved part of the fork is firmly keyed in a solid casting which is bolted to a suitable foundation, and to each arm of the fork is secured a 35 lb. weight. Outside of and near the end of each arm is placed a very small electro-magnet. These magnets are connected with each other, and with a commutator that is operated by one of the arms.

The arms make 35 vibrations per second, the amplitude of which is ⅛ inch. Small arms extend from the fork arms into a box containing a miniature pump having two pistons, one piston being attached to each arm. Each stroke of the pump raises a very small quantity of water, but this is compensated for by the rapidity of the strokes. Mr. Edison proposes to compress air with the harmonic engine, and use it as a motive agent for propelling sewing machines and other light machinery. The power must be taken from the fork arms so as not to affect the synchronism of their vibrations, otherwise the engine will not operate.



EDISON'S HARMONIC ENGINE.

Television

Operation

The wiring completed, the radiovisor is ready for attachment to the shortwave receiver, described last month.

This accomplished, connect the shortwave receiver to a speaker in order to facilitate the tuning of the television signal, which may be audibly recognized by the steady pitched buzz of the television transmitter. When the signal has been tuned into maximum volume and clarity it may be transferred to the radiovisor. The neon lamp should glow when it is connected to the output stage of the receiver. The motor is turned on, and as the scanning disc gains speed the image will appear. The scanner is kept at the proper speed by means of the rheostat and snapping the switch off and on several times, while the picture is framed by moving the lamp housing vertically or turning it horizontally.

Synchronization is the most important term in the adjusting of the radiovisor. The images as viewed may lean to the left or right, depending on the scanning disc gaining on the transmitted image, or falling behind. To get the disc in perfect synchronization with the transmitted image, the speed control rheostat should be turned to the left or the right until the desired effect is obtained. It is possible to hasten the synchronization by pressing lightly on the protruding scanning disc shaft at just the right time and place. A little experimenting with the controls of the radiovisor, and the operator will get the knack. The self synchronized radiovisors with shadow boxes will be discussed in a future article in RADIO NEWS.

The experimenter is not "telewise" until he understands the operation of his set. If the set does not work properly the symptoms should be examined. For the benefit of the novice the following list of symptoms, diagnoses and cures is given:

Television lamp glows on reverse side.—Rubber-covered leads wrongly connected to receiver or power amplifier. Reverse the connection.

Television lamp fails to glow.—Insufficient output voltage. This symptom is not possible when the radiovisor is used in conjunction with the Jenkins Television Receiver.

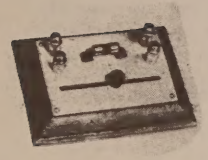
Excessively bright screen, lacking in shadows.—An indication of excessive voltage applied to television lamp. A suitable high (variable) resistance should be placed in the plate circuit of the power tube or in series with the neon or television lamp.

Signals tuned in cannot be reproduced.—Off-standard signals are being picked up such as 45 or 48 line pictures. These cannot be reproduced on the standard scanning disc of sixty lines revolving at twenty complete frames per second. Forty-eight line discs may be secured for tuning in such stations as still transmit 48 line images. For the most part, a 60 line 20 frame per second picture is considered standard in television circles.

If the reader has followed the instructions given in this article and the one previously published in RADIO NEWS concerning the building of the shortwave television receiver, he has constructed a very good television receiving station. He may expect good images within a radius up to several hundred miles, depending on local reception conditions, with regularity. A number of enthusiasts report that they received regular images from the New York, Boston and Washington stations. Others have reported having seen these stations up to twelve and fifteen hundred miles. At the present time a number of new stations are waiting to be licensed by the Federal Radio Commission and as these are to be located in widely different parts of the country the time is near at hand when television programs will reach even the most remote parts of the country. At present stations are located in Boston, New York, Long Island City, Passaic, Chicago, Washington and on the West Coast.

TRADE NAME: Thermiodyne.
MODEL: TFS.
TYPE: Three radio, detector and two audio.
TUBES: Six.
BATTERIES: None furnished.
CONTROLS: One.
AERIAL: Indoor and outdoor.
PRICE: $140.00
MANUFACTURER'S NAME: Shepard-Potter Co.

TRADE NAME: Tuska Superdyne.
MODEL: 305.
TYPE: One radio, detector and two audio.
TUBES: Four.
BATTERIES: None furnished.
CONTROLS: Two.
AERIAL: Outside or inside.
PRICE: $350.00 without accessories.
MANUFACTURER'S NAME: The C. D. Tuska Company.

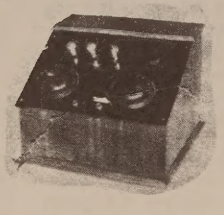


TRADE NAME: "Van Crystal Receiver."
TYPE: Fixed crystal (no tubes or batteries required).
CONTROL: One.
AERIAL: Outdoor.
PRICE: $3.50.
MANUFACTURER'S NAME: L. D. Van Valkenburg Co.

TRADE NAME: "Ware."
MODEL: W.
TYPE: Neutrodyne.
TUBES: Five 201A type.
BATTERIES: "A" 6-volt storage; "B" 90 volts.
CONTROLS: Three.
AERIAL: Inside or outside.
PRICE: $175.00 without accessories.
MANUFACTURER'S NAME: Ware Radio Mfg. Company.

TRADE NAME: "Ware."
MODEL: WU.
TYPE: Neutrodyne with built-in loud speaker.
TUBES: Five 201A type.
BATTERIES: "A" 6-volt storage; "B" 90 volts.
CONTROLS: Three.
AERIAL: Inside or outside.
PRICE: $300 without accessories.
MANUFACTURER'S NAME: Ware Radio Mfg. Company.

TRADE NAME: Ware Neutrodyne Receiver.
MODEL: T.
TYPE: Neutrodyne reflex.
TUBES: Three U.V. 199's.
BATTERIES: May be contained in cabinet.
CONTROLS: Two.
AERIAL: Outdoor.
PRICE: $65 without accessories.
MANUFACTURER'S NAME: Ware Radio Corporation.



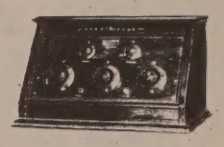
TRADE NAME: Ware Neutrodyne Receiver.
MODEL: TU.
TYPE: Neutrodyne reflex with built-in loud speaker.
TUBES: Three UV-199.
BATTERIES: Place in cabinet.
AERIAL: Outdoor.
CONTROLS: Two.
PRICE: $150 without accessories.
MANUFACTURER'S NAME: Ware Radio Corporation.

TRADE NAME: Wells Receiver.
MODEL: 23.
TYPE: Two radio, detector and two audio.
TUBES: Five.
BATTERIES: None furnished.
CONTROLS: Three.
AERIAL: Outside or inside.
PRICE: $90.00 without accessories.
MANUFACTURER'S NAME: Wells Manufacturing Company.

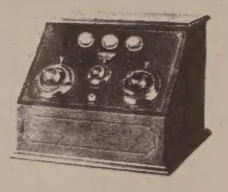
TRADE NAME: Wells Receiver.
MODEL: 24.
TYPE: One radio, detector and two audio.
TUBES: Four.
BATTERIES: None furnished.
CONTROLS: Two.
AERIAL: Outside or inside.
PRICE: $70.00 without accessories.
MANUFACTURER'S NAME: Wells manufacturing Co.

TRADE NAME: Wells Receiver.
MODEL: 25.
TYPE: One radio, detector and two audio.
TUBES: Four.
BATTERIES: None furnished.
CONTROLS: Two.
AERIAL: Outside or inside.
PRICE: $65.00 without accessories.
MANUFACTURER'S NAME: Wells Manufacturing Co.

TRADE NAME: "Workrite."
MODEL: Airmaster.
TYPE: Neutrodyne.
TUBES: Five.
BATTERIES: "A" and "B" needed.
CONTROLS: Three.
AERIALS: Inside or outside.
PRICE: $120.00 without accessories.
MANUFACTURER'S NAME: Workrite Mfg. Company.



TRADE NAME: "Workrite Chum."
TYPE: Reflexed Neutrodyne.
TUBES: Three UV-199.
BATTERIES: Compartment in cabinet for "A" and "B" batteries.
CONTROLS: Two.
AERIAL: Inside or outside.
PRICE: $65.00 without accessories.
MANUFACTURER'S NAME: Workrite Mfg. Company.



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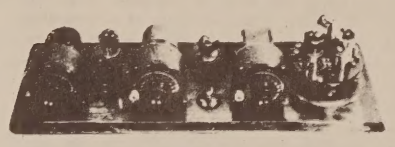

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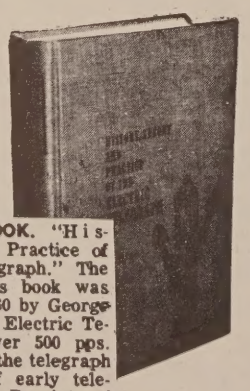

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"Instantaneous" Recording of Sound on Discs

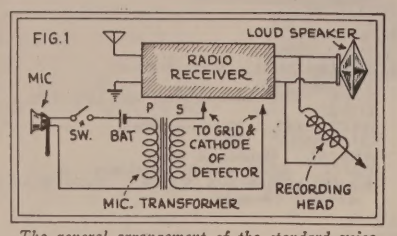
A New Activity for the Radio Technician and Experimenter

By GEORGE J. SALIBA

"INSTANTANEOUS" recording, or home recording as it is more popularly called, is a new art as compared with the method of making commercial records. In commercial recording, it is necessary to go through several operations before the finished record is obtained. Where only one record is desired, instantaneous recording offers the advantage of making this record in one operation. (See "Home Recording of Radio Programs and Speech," in the December, 1930, issue of RADIO-CRAFT.)

The midget radio set saved radio in 1930, and now this new art seems destined to surpass even the midget in tiding radio over the rough spots; at the same time it opens up a very lucrative field to the alert Service Man and radio dealer. Wherever there is an audio amplifier available, a recording system is waiting to be exploited.

The uses to which this instantaneous recording can be put are varied and many; and the profits to be realized therefrom will be proportional to the foresight and ability of the Service Man or salesman who puts across the idea and makes the installation. Every home that has a radio receiver, every music school, music store, amusement park, department store, club, and broadcast station is a good live prospect. In short, the field of application for this novel method of making records is unlimited; and it remains only for the energetic salesman or wide-awake Service Man to familiarize himself with the technique of obtaining good results, then go out and demonstrate. The idea sells itself.



The general arrangement of the standard voice and radio recording-reproducing equipment.

Valuable Uses of Records

The uses to which instantaneous recording can be put are unlimited. Orchestras and bands are now being recorded, so that their technique may be studied carefully and improved upon. Singers, instrumental artists and music students everywhere are making this recording a regular part of their course; since they can thus watch their progress and note their improvement. Students of elocution record their talks and study their delivery. Records of broadcasts can be made, and, if necessary, encore programs can then be broadcast. Likewise, anyone who broadcasts can have his selections recorded for his personal file.

Vaudeville singers or musical acts will find this new art very much to their advantage; for they can use these records for advertising purposes and auditions at distant points. Another novel application of this instantaneous recording is in the making of "sound effects" for amateur theatricals. The ambitious producer can, after patient experimenting with the recording of different sounds, electrically reproduce them whenever desired; thus giving his presentation the realism of the professional theatre.

Still another idea and one which is presented to those owning home-movie outfits, is that the "domestic" photographer can make records to match the action of the pictures; thus producing a "talkie." A more advanced form of this idea is that two turntables be used, and a "continuous" show be arranged after properly "dubbing" the records (patching the sound together), by fading one record into another as each length of film (to which has been cemented the next length) is run through the projector.

Although the previously-mentioned issue of RADIO-CRAFT contained a description of the procedure of instantaneous recording (page 340, December, 1930), the writer asks the indulgence of the readers of this magazine while, as a matter of completeness, and prior to making an extensive study of this subject, we gloss over outstanding facts.

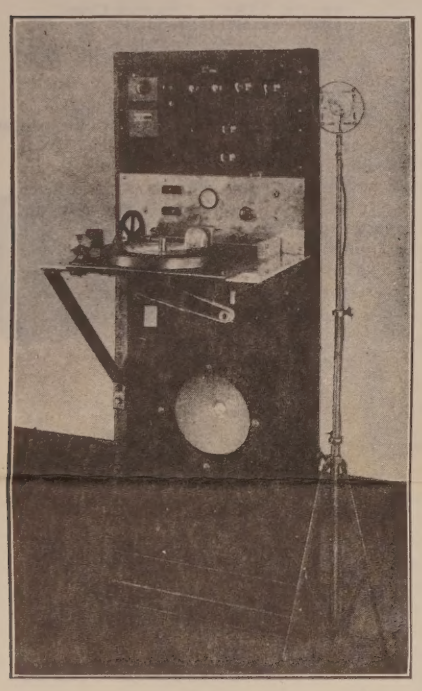


Fig. E

The Callophone studio equipment: top panel, three-stage amplifier and pack; then, microphone panel; shelf with turntable, feed-screw, cutter and pickup; driving motor; and, lowermost, reproducer. Blank, ungrooved discs are used. Right, two-button microphone and stand.

Fig. A (above)

The portable kit arranged for recording; the pickup arm is resting in off position, and the cutting head and feed screw are in operation. Microphone at the left, '27 microphone amplifier tube at upper left. At the right, in Fig. B, the cutting head is seen put away in its recess, and the pickup in its operating position. The disc at the lower left is the switching mechanism.

Fig. B (below)

Kit arranged for playback.

Recording Systems

Whether the recording equipment is utilized in commercial enterprises or for home use, the apparatus in either case is substantially the same. For home use the audio amplifier of the radio receiver, used in conjunction with an ordinary magnetic phonograph pickup and a microphone makes a simple but efficient and practical recording system. (See Fig. 1).

This system makes use of *pregrooved* records, which are now available at all music and radio stores. The pregrooved record, which is made up on either a metal or a celluloid disc, has a blank groove already cut into the surface; and this groove serves the same purpose as the feed screw used in recording on blank uncut discs; namely, to guide the recording head across the face of the record. The microphone transformer, being of the step-up type, amplifies the audio-frequency voltages; and this gain, combined with the *mu* or amplification factor of the detector tube, really adds a transformer-coupled stage to the audio amplifier.

A weight (about 10 oz.) should be attached to the recording head to prevent the needle from jumping the groove, as it tends to do when modulated. The weight also serves the purpose of pushing the needle deep into the groove, thus making available more mass to work against; with the subsequent result of more volume in the reproduced record.

Only home-recording needles should be used for recording and playback. These needles, which have a relatively dull point, with a red shank to differentiate them from regular phonograph needles, can be obtained at all radio and music stores.

In recording from the microphone, the switch Sw. is closed, and the volume control of the radio set is turned way down; and *vice versa* when records are to be made from the air. With a little patience and experimenting the home recorder can achieve results that will be almost on a par with commercially-pressed records.

These pre-grooved records at present are obtainable only in the six-inch size and have a playing time of one minute and ten seconds. The home recorder who wishes to make larger records, must resort to blank ungrooved discs, which necessitate the use of a feed-screw to guide the cutting head across the face of the disc. Figs. A, and B show different views of a recording kit, for cutting blank discs, which is intended for homes where a motor-driven turntable is not available, A microphone, microphone amplifier, selector switch, volume control, feed screw, recording head and pick up, electric motor, and turntable, are all neatly mounted in this very convenient portable case.

High-Quality Recording

Commercial instantaneous recording naturally requires a more elaborate set-up. The prime requisite is a good audio amplifier, which should be of the three-stage transformer-coupled type, and have a fairly flat characteristic from about 30 cycles to 9000 cycles. The turntable should be thoroughly "filtered;" so that any mechanical flutter in the motor or any back lash in the gears will not be transmitted to it.

A high-quality double-button carbon microphone is absolutely essential and, to insure its efficient operation, a D.C. 0-50 milliammeter should be provided, so that the current in each button may be read.

A good loud speaker, preferably of the dynamic type, should be used for monitoring purposes, and, lastly, a "volume-indicator panel" is necessary in order that all the records shall be made at the same level, thus insuring a positively good result. Some will argue that a volume-indicator panel can be dispensed with and the loud speaker used for level indication; but the recorder will find that the average human ear, no matter how acute the sense of hearing, is a notoriously poor judge of level from day to day. The small outlay of money necessary for a volume indicator is more than offset by the insurance of good records at all times.

For radio recording, a good radio receiver and a double turntable, equipped with a "fader" so that continuous recordings can be made, are absolutely necessary. If facilities are to be provided for bands and orchestras, a "mixing panel" should be built. This panel should be able to accommodate at least three microphones.

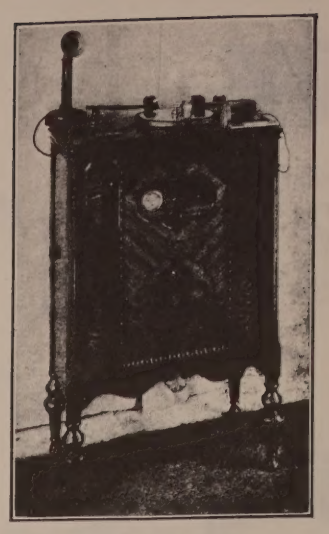


Fig. D

A home-recording model made by the Callophone Co.: left, two-button "mike"; right, special cutting head, for blank records. The reproducing pickup is behind the disc in the center; microphone panel above speaker in console.

In addition to this special equipment, it is necessary that the blank records contribute their bit to the engineering necessary for good sound. Their composition, the manner in which they are cut, the type of cutting tool used, and the *modus operandi* of the playback, while they have been discussed in the December, 1930, issue of RADIO-CRAFT, will be viewed in the light of later developments.

Materials for Recording

At the present time there are several materials available for instantaneous recording: namely, gelatin, aluminum, celluloid, and zinc. Gelatin records are of the blank type requiring a feed-screw for cutting. A special cutting stylus is used and, before recording, the surface is treated with a lubricant, such as vaseline, in order to preserve the keenness of the needle. After the record is made it is again treated with this grease in order to attain reproduction without extraneous noises. Playback is effected by means of a steel needle whose point has been ground smooth and round. An excellent record can be made with this substance; but it possesses the disadvantage of being brittle. Great care must be exercised in putting the record on the turntable and removing it; otherwise the record will crack. Water must be kept away from this record, because gelatin dissolves in water.

Aluminum, like gelatin, also requires a feed-screw for recording. A diamond needle or a special steel needle is required for recording, and a fibre or a thorn needle is used for playback. The aluminum record possesses the advantage of being unbreakable and can be preserved indefinitely. The recording is excellent, the low frequencies and the high recording equally well. If sufficient weight is not used on the recording head, the groove will be shallow and, consequently, difficulty will be experienced in making the playback needle track. This needle must be very sharp, otherwise poor reproduction results.

Celluloid for recording is obtainable in either blank or pregrooved discs. When the blank is used, a sharp diamond needle is necessary to cut the grooves, and a thorn or fibre needle is used for playback. The pregrooved disc requires a special home-recording needle for both recording and playback. With the latter type record, it has been found that the high frequency notes are missing after the first or second playing; this is due to the fact that celluloid is resilient and tends to come back to its original shape. The volume is a trifle lower after a few playings, an effect also due to the resiliency. These records can be played back about fifty times.

The *nitrate* celluloid (pre-grooved) which is the kind used generally for recording, is highly inflammable and great care should be exercised in keeping it away from any flame. It should be stored in fire-proof containers. The *acetate* celluloid, which is non-inflammable, also makes fairly good records; but, at present, it is obtainable only in blank discs.

The pre-grooved zinc composition record is the oldest instantaneous record and was originally used for home recording by means of the sound box in the acoustic phonograph. Recording was then accomplished by placing the disc on the turntable and singing or talking in a loud voice into the horn. At best the reproduction was faint. These records can now be used for electrical recording with fairly good results. An ordinary phonograph steel needle is used for both recording and reproducing.

LETTERS

EDITOR'S MAILBAG

Dear Sir,
Can you be of any assistance in regard to a Crosley Dynacone. My interest is in the terminals, as to which winding goes "where".

T. A. Drogaski
507 Coal Valley Road
Clairton, Penn. 15025

EDITOR'S NOTE; Help!!

Kate Smith

WHEN Morton Downey shifted from a daily CBS period to the Camel Quarter Hour, network officials assigned the bright fifteen-minute sustaining program spot to Kate Smith, stage star. Miss Smith, a comparative newcomer to radio, recently joined Columbia after a brief affiliation with the NBC. She was born in Washington and, believe it or not, studied medicine before following a theatrical career. She appeared in vaudeville for the first time six years ago and shortly after appeared in the musical show "Honeymoon Lane." Her latest Broadway appearance was in "Flying High." She was recently featured in the stage presentations of the Capitol Theatre.

MART

EASY COST CHART

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1-25	1.35	2.45	3.45	12.75
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36-40	2.25	3.90	5.50	20.35
41-45	2.50	4.40	6.15	22.95
46-50	2.75	4.80	6.85	25.45
51-55	3.05	5.30	7.55	28.00
56-60	3.30	5.80	8.25	30.55
61-65	3.65	6.30	8.95	33.05
66-70	3.90	6.75	9.65	35.60
71-75	4.15	7.25	10.30	38.20
76-80	4.45	7.75	11.00	40.75
81-85	4.70	8.20	11.70	43.25
86-90	5.00	8.70	12.35	45.80
91-95	5.25	9.20	13.05	48.40
96-100	5.50	9.65	13.75	50.90
101-110	6.00	10.65	15.15	56.00
111-120	6.60	11.65	16.50	61.00
121-130	7.20	12.55	17.85	66.20
131-140	7.75	13.50	19.25	71.25
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Photo ads $2.00 extra.

MISC.

FOR SALE: Rubber stamp with your name and address plus AK Radio and speaker $3.00 pp. James Fred, P. O. 42, Rossville IN. 46065.

WILL REPAIR, restore, refinish, renew or rebuild your old radio. Buy, sell or trade tubes, parts and radios. Bob Lucas, 9014 Mahoning, Houston TX 77036.

PROFESSIONAL CW operators, retired or active, commercial, Military, Gov't, police, etc., invited to join Society of Wireless Pioneers, W7GAQ/6, Box 530, Santa Rosa CA 95402.

SCOTT and McMurdo Silver radio lovers are welcome to contact J. W. F. Puett at 3008 Abston Dr., Mesquite TX 75149.

FOR SALE OR TRADE

SCARCE RADIO TUBES: Pre-1933, new in original boxes; TB-1 extremely Rare, brass base, used in WWI wireless, $35. ea. 201A, 301A, 331, 199, 120, 864 (same characteristics as WD-11); $15. ea. Post-1933, new, 26, 27, 40, 45, 71A, 182B (same as 71A) $8. ea. VT204, 37, 38, 39, 43, 44, 47, $5. ea. USED TUBES SELL FOR ½ NEW TUBE PRICE. Display Tubes $1. ea. (low emission, open/shorted filament etc.) James McGrath, 2 Centerview Lane, West Seneca, N. Y. 14224.

on the Air

Many readers want more techincal articles. We are now working on an article about the Radiola Catacomb (name for early R. C. A. chassis.) What kind of articles do you prefer? After all these pages are yours.

Be sure to demand that the secretary of your club sends us its schedule of events. We will be glad to print your club's news.

FOR SALE OR TRADE

ANTIQUE-Add extra class to your collection with a 50 year old J7A Telegraph key! Dated 1923, it has a brass dome and keying arm, and a large Navy type knob-Flame Proof type. New, but not perfect because of years of storage in the Brooklyn Navy Yard. $12.95ppd. Also, W. U. Tele Co. Main line sounders, good, used type 17A and 15B, $25.00ppd., each. Buy-Trade-Sell Telegraph, Radios, Books--what have you? Walt's Emporium, P. O. Box 19406, Dallas, Texas, 75219.

FOR SALE: 1928 SPARTON RADIO: Model 69, in almost new condition. Cabinet and chassis and separate speaker free from marks or scratches. Schematic diagram and spare tubes. And it plays beautifully. No reasonable offer refused. OAK LAWN BOOKS, Box 2663, Providence, R. I. 02907.

FOR SALE: Type 864 (VT-24) tubes. New guaranteed. Electrical replacement for WD-11, WD-12, etc. $2.00 each, postpaid. Quantity Limited. Len D'Airo, Box 54, Massapequa Park, N. Y. 11762.

TINKER'S DAM BARN WORKES: Crystal and Battery Radios, Speakers, Parts, Literature. SASE for stock list. Main Street, Wilton, NH 03086. 1-603-889-4254 after 9PM EDT.

FOR SALE OR TRADE

ILLUSTRATED ANTIQUE and old Test Equipment bid sheets available. Please send $1.00 for printing and postage. Walt's Emporium, Dept. H P. O. Box 19406, Dallas TX 75219.

WD11 Adaptors, use UX199, 120, VT24. No Wiring changes, Radiola III's Battery hoop up included $5.25 pp., 2 for $9.25. Keith Parry, 17557 Horace St., Granada Hills CA 91344.

1921-1931 Schematics and service data where available $2.00. Cecil Bounds, Pine Springs Rte., Carlsbad, N. M. 88220.

FOR SALE: RCA Loud Speaker model 100 $35.00. Express extra. Pat Cutini, 969 Genesee, Buffalo, N. Y. 14211.

FOR SALE: Rubber stamp with your name and address plus AK Radio and speaker $3.00 pp. James Fred, P. O. 42, Rossville IN 46065.

TUBE LIST - Many collector types, VT-1, VT-2, 211-A, etc. New in Signal Corps Boxes. SASE please. Cecil Bounds, Pine Springs Rte., Carlsbad, N. M. 88220.

BUY SELL REPAIR RADIOS. Have literature and most tubes. Radio also T. V. to present. In this business since 1908. Church - Radio Hill, Haddam, Conn. 06438.

WANTED

WANTED: Radiola II, III, 25, early wireless books, magazines, tubes, parts, sets etc. Will Nangle, 761 No. 29th St., Milwaukee, Wisconsin 53208.

WANTED: Atwater Kent Breadboards, "M" and "G" horns, phono pickup, All original literature. Music Master receivers, horns, V and VIII speakers, headphones, literature. Harry R. Katz, 415 So. Tenth St., Phila. PA 19147

WANTED: Table model radio by Rudolph Wurlitzer Co., and information about their manufacturing operation. Also W. E. 8-Ball Microphone, two WD11's, and Book; "Mitchell's Manual of Practical Projection." Earl McDonald, 9922 Tanglevine, Dallas TX 75238.

WANTED: Philmore battery & electric sets. Also, Selective and Blackbird models. Quote price in first letter. William Hemrick, Route 1, Terra Alta, West Virginia 26764.

WANTED: E. H. Scott "All-Wave" set in mint condition; Also interested in any other product or literature of Scott, General Radio and Weston. John Field, 1700 Mission St., Santa Cruz CA 95060.

WANTED: Old radio books, catalogs, Gernsback Manuals, Early test equipment. Give price in first letter. William Hemrick, Route 1, Terra Alta, West Virginia 26764.

WANTED: ZENITH Radios, early TV's, phones, signs, other Zenith products. Walter D. Holliday, 119 W. St., Charles Rd., Lombard, Ill. 60148.

puett electronics | 3008 ABSTON DRIVE MESQUITE, TEXAS 75149

TUBE LIST No. 9A all prices subject to change without notice.

HOW TO ORDER:
(1) Make all checks or money orders payable to J.W.F. Puett.
(2) Please state whether new or used tubes are desired and whether a reduced-price used tube is desired when a new tube is out of stock. REFUNDS are mailed with your invoice for out-of-stock tubes, or when, by customer request, a used tube is substituted for an out-of-stock new tube.
(3) All orders are shipped parcel post - no C.O.D. INCLUDE 15% FOR POSTAGE & HANDLING. INSURANCE RATES ARE 30¢ for orders under $50.00. TEXAS RESIDENTS ADD 5% STATE SALES TAX. MINIMUM ORDER $3.00.

ALL TUBES ARE THOROUGHLY TESTED on a mutual conductance tube checker before shipment. CUSTOMER SATISFACTION GUARANTEED -- If you are not satisfied with your order for any reason, tubes may be returned within ten days for refund or replacement with exception of tubes which are shorted or have open filaments. It will be assumed that returned tubes with open filaments or shorts were damaged in shipment. Shipping damage claims will be handled promptly through the post office on insured orders. Puett Electronics assumes no liability for orders which are not insured, and no liability beyond that which is covered by postal insurance.

IN TABLES 1,4 & 6 THE SYMBOL n INDICATES THAT A TUBE IS AVAILABLE NEW AND THE SYMBOL u INDICATES THAT IT IS AVAILABLE USED.

TABLE 1 - OLDER TYPE-NUMBER TUBES - prices listed for new tubes used tubes are half new price

0	u	$4.	5Z3	nu	$2.	6ZY5	nu	$3.	14C5	n	$3.
1A3	n	$3.	5Z4	nu	$2.	7A4	nu	$3.	14C7	n	$3.
1A4	nu	$3.	6A3	n	$3.	7A5	n	$3.	14F7	n	$3.
1A5	u	$3.	6A4	nu	$4.	7A6	nu	$3.	14P8	n	$3.
1A6	n	$3.	6A5	n	$3.	7A7	nu	$3.	14H7	n	$3.
1A7	nu	$2.	6A6	nu	$3.	7A8	nu	$3.	14J7	nu	$3.
1B4	n	$2.	6A7	nu	$4.	7AF7	nu	$3.	14N7	n	$3.
1B5	u	$3.	6A8	nu	$3.	7AG7	nu	$3.	14Q7	nu	$3.
1C5	nu	$3.	6B4	nu	$4.	7AK7	u	$3.	14W7	n	$3.
1C6	n	$3.	6B5	nu	$4.	7B4	nu	$3.	14X7	n	$3.
1C7	u	$4.	6B6	nu	$4.	7B5	nu	$3.	15	u	$5.
1D5	u	$4.	6B7	nu	$4.	7B6	nu	$3.	19	nu	$3.
1D8	nu	$4.	6B8	nu	$3.	7B7	u	$3.	24A	nu	$3.
1E5	u	$3.	6C5	nu	$2.	7B8	nu	$3.	25A6	n	$3.
1E7	n	$3.	6C6	nu	$3.	7C5	nu	$3.	25A7	nu	$3.
1F4	n	$3.	6C7	n	$3.	7C6	u	$3.	25B6	u	$3.
1G4	nu	$3.	6C8	nu	$3.	7C7	nu	$3.	25C6	u	$3.
1G5	u	$3.	6D6	nu	$3.	7E6	u	$3.	25L6	nu	$2.
1G6	u	$2.	6D7	n	$3.	7E7	nu	$3.	25S	u	$3.
1H4	u	$3.	6E6	n	$3.	7F7	nu	$3.	25Z5	nu	$2.
1H5	nu	$2.	6E7	u	$3.	7F8	nu	$3.	25Z6	nu	$2.
1H6	nu	$2.	6F5	nu	$3.	7G7	u	$3.	26	nu	$4.
1LA4	n	$3.	6F6	nu	$3.	7H7	u	$3.	26A6	n	$3.
1LA6	nu	$3.	6F7	nu	$5.	7J7	n	$3.	26A7	nu	$3.
1LB4	nu	$3.	6F8	nu	$2.	7K7	u	$3.	27	u	$3.
1LC5	n	$3.	6G6	nu	$3.	7L7	nu	$3.	28D7	nu	$3.
1LC6	n	$4.	6H6	nu	$2.	7N7	nu	$3.	30	u	$3.
1LD5	nu	$3.	6J5	nu	$3.	7Q7	nu	$3.	31	nu	$3.
1LE3	n	$4.	6J7	nu	$3.	7R7	n	$3.	32	n	$3.
1LF3	n	$4.	6J8	u	$3.	7S7	nu	$3.	32L6	u	$2.
1LG5	n	$3.	6K5	nu	$3.	7V7	nu	$3.	32L7	n	$3.
1LH4	nu	$3.	6K6	nu	$3.	7X6	n	$3.	33	n	$3.
1LN5	nu	$3.	6K7	nu	$3.	7X7	u	$3.	34	nu	$3.
1N5	nu	$3.	6K8	nu	$3.	7Y4	nu	$3.	35	u	$3.
1P5	nu	$3.	6L5	n	$3.	7Z4	nu	$3.	35Y4	u	$2.
1Q5	nu	$2.	6L6	nu	$3.	12A7	nu	$3.	35Z3	nu	$2.
1V	n	$4.	6L7	nu	$3.	12A8	u	$3.	36	u	$3.
2A3	nu	$5.	6N5	n	$3.	12B7	u	$3.	37	u	$3.
2A4	nu	$4.	6N6	nu	$3.	12B8	u	$3.	38	nu	$3.
2A5	u	$3.	6N7	nu	$3.	12C5	nu	$3.	39	nu	$3.
2A6	nu	$3.	6P5	nu	$3.	12C8	nu	$3.	41	nu	$3.
2B7	nu	$3.	6Q7	nu	$3.	12F5	n	$3.	42	nu	$3.
3C6	n	$3.	6R7	nu	$3.	12J5	nu	$3.	43	nu	$3.
3LF4	n	$3.	6S7	nu	$4.	12J7	nu	$3.	44	nu	$3.
3Q5	nu	$2.	6S8	n	$3.	12K7	nu	$3.	45	u	$4.
5R4	u	$2.	6T7	u	$3.	12K8	nu	$3.	46	nu	$4.
5T4	nu	$2.	6T8	n	$2.	12Q7	nu	$3.	47	nu	$5.
5U4	nu	$2.	6U6	nu	$3.	12Z3	u	$3.	48	n	$5.
5V4	nu	$2.	6U7	nu	$4.	14A4	n	$3.	49	n	$4.
5W4	nu	$2.	6V6	nu	$2.	14A7	u	$3.	50A5	nu	$2.
5X4	nu	$2.	6Y7	nu	$3.	14B5	n	$3.	50C6	n	$2.
5Y3	nu	$2.	6Y6	nu	$2.	14B6	nu	$3.	50X6	nu	$3.
5Y4	nu	$2.	6Z4	nu	$2.	14B8	n	$3.	51	u	$3.

ADDITION:
2E5 n $4.
6G5 n $3.
10/VT-25 n $4.

WE HAVE A FEW OLD RADIO TECHNICAL BOOKS - send S.A.S.E. for list.

TABLE 2 - OLD STYLE GLASS ENVELOPE TUBES
all are used, thoroughly tested
Tube type numbers are listed under manufacturers names.

Ace:		Cunningham:		Magestic:		Philco:		Radiotron:		Sylvania:	
X-224	$3.	C324	$4.	G27	$3.	24	$3.	UX222	$4.	SY224	$4.
Arcturus:		CX326	$4.	G35S	$3.	26	$4.	UY224	$4.		
(blue glass)		CX327	$3.			27	$3.	UY227	$3.	SX280	$2.
No. 27	$5.	CX332	$4.	National		36	$3.	35	$2.	Tung Sol:	
No. 61	$5.	CX345	$4.	Union:		37	$3.	UX245	$4.	24	$3.
Crosley:		56	$3.	NY224	$4.	80	$2.	56	$3.	Wizard:	
56	$3.	CX371	$5.	39	$2.			71A	$5.	226	$4.
Ken Rad		80	$2.	Ferryman:							
UX245	$4.	CX380	$3.	PA-224	$4.						
56	$3.										

WD-11 substitute TYPE 864 - $2.00 each

TUNGAR BULBS
new .5,2 or 15 amp - $3.00 ea

TABLE 3 - TUBE COLLECTOR SPECIALS

Radiotron:		Cunningham:		Majestic:	
10 used	$5.00	CX350 used	$6.00	A.P.(rectifier) used	$5.00
WX12 used	$7.00	De Forest		Raytheon:	
UX200 new	$9.00	Audion:		B-H (rectifier) used	$5.00
used	$5.00	450 used	$6.00	VISITRON (photo cell)- new	$5.
UX240 used	$5.00			WE212F used	$15.00
WESTINGHOUSE PROJECTION BULB TYPE T20 C13F 500W - new $5.				852 used	$15.00

TABLE 4 - MORE RECENT TUBE TYPES - prices listed for new tubes used tubes are half new price

0A2	n	$2.	6AT6	nu	$2.	12A5	nu	$3.	35Z5	nu	$2.	1629	u	$3.
0A3	u	$2.	6AU6	nu	$2.	12A6	nu	$3.	3526	nu	$3.	1633	u	$2.
0B3	u	$2.	6AV6	nu	$2.	12AT6	nu	$2.	4025	u	$3.	1634	u	$2.
0C3	nu	$2.	6BA6	nu	$2.	12AT7	u	$2.	4523	n	$3.	1635	u	$2.
0D3	nu	$2.	6BE6	nu	$2.	12AU6	nu	$2.	4525	nu	$3.	2050	nu	$3.
0Y4	n	$3.	6BJ6	nu	$2.	12AU7	nu	$2.	50B5	nu	$2.	2051	nu	$3.
0Z4	nu	$3.	6C4	nu	$2.	12AV6	nu	$2.	50C5	nu	$2.	5686	n	$2.
1L4	n	$4.	6J6	nu	$2.	12BA6	nu	$2.	50L6	nu	$2.	5691	n	$2.
1L6	n	$5.	6S4	n	$2.	12BE6	nu	$2.	50Y6	nu	$3.	CK-		
1R5	nu	$2.	6SA7	nu	$3.	12L6	nu	$3.	50Y7	nu	$3.	5703	u	$2.
1S4	n	$1.	6SB7	nu	$3.	12SA7	nu	$2.	117-			5749	u	$2.
1S5	u	$2.	6SC7	nu	$2.	12SC7	n	$3.	Z3	nu	$3.	5751	nu	$2.
1T4	nu	$2.	6SD7	nu	$3.	12SF5	n	$2.	117-			5814	n	$2.
1T5	nu	$2.	6SF5	n	$2.	12SF7	n	$2.	Z4	u	$3.	5879	n	$2.
1U5	nu	$2.	6SF7	n	$2.	12SG7	nu	$3.	807	nu	$5.	5881	u	$4.
2C26	u	$3.	6SG7	nu	$3.	12SH7	n	$3.	879	n	$3.	5992	n	$2.
2X2	n	$3.	6SH7	nu	$2.	12SJ7	nu	$3.	884	n	$5.	6080	u	$4.
3A4	nu	$2.	6SJ7	nu	$2.	12SK7	nu	$2.	930	n	$3.	6842	n	$2.
3A5	nu	$2.	6SK7	nu	$2.	12SL7	nu	$3.	950	u	$4.	6973	n	$2.
3A8	n	$3.	6SL7	nu	$2.	12SN7	nu	$2.	955	n	$4.	7193	u	$2.
3Q4	nu	$2.	6SN7	nu	$1.	12SQ7	nu	$2.	958	u	$4.	VR90	nu	$2.
3S4	nu	$2.	6SQ7	nu	$2.	12SR7	nu	$3.	CK-			VR-		
3V4	nu	$2.	6SR7	nu	$2.	12V6	nu	$3.	1005	u	$3.	105	n	$2.
6AB4	nu	$2.	6SS7	nu	$2.	12W6	n	$2.	E1158	u	$3.	VR-		
6AB7	nu	$2.	6SU7	n	$2.	12X4	n	$2.	1201	u	$3.	150	nu	$2.
6AC5	nu	$2.	6SV7	n	$2.	19T8	nu	$3.	1203	u	$3.			
6AG7	nu	$2.	6W6	nu	$2.	35A5	nu	$3.	1232	u	$3.	ADDITION:		
6AK5	nu	$2.	6X4	nu	$2.	35C5	nu	$2.	1273	u	$3.	1U4	n	$2.
6AL5	nu	$2.	6X5	nu	$1.	35L6	nu	$2.	1612	u	$3.	2E30	n	$3.
6AL7	n	$2.	6Y5	u	$2.	35W4	u	$2.	1625	u	$4.	6SY7	n	$2.
6AQ5	nu	$2.	6Y7	u	$2.	3524	nu	$2.	1626	u	$3.	35B5	n	$2.
												6146	n	$3.

TABLE 5 - BALLAST TUBES - $3.00 each - all are new

JFD Type A,B & C; K36A; K49B; K80C; KQ2B; KX49B; L55B; 2B14; 3H7; 4P45; 7H11; 40A1; 100-77; 100-79; 165R; 165R4; 185R4; 250R; 6092A. AMPERITE 3TF7; VICTOREEN 1300-8

TABLE 6 - TV AND MISC. TYPES - tubes in this table are priced at - $2.00 new, $1.00 used

1AX2	n	3BN6	nu	4BQ7	n	5AZ4	n	5T8	nu	6AM8	u	6EM8	n	10DE7	n	12BH7	nu	17DQ6	nu
1B3	nu	3BU8	nu	4BZ6	u	5B8	n	5U8	u	6AN8	nu	6ES8	u	10JT8	n	12BK5	n	19AU4	n
1D21	n	3BY6	n	4BZ7	u	5BQ7	n	5V6	u	6AQ7	nu	6EZ5	n	12AD6	n	12BQ6	u	19BG6	n
1X2	nu	3BZ6	nu	4CB6	nu	5BR8	n	5X8	n	6AR5	n	6FC5	u	12AF3	n	12BY7	nu	25A05	n
2BN4	nu	3CB6	nu	4CS6	n	5CG8	nu	6AC5	nu	6AR6	u	6FG5	u	12AH7	nu	12BZ7	n	25AV5	n
2CY5	u	3CS6	nu	4DK6	u	5CL8	nu	6AC7	nu	6AS5	nu	6FL8	u	12AJ6	u	12CA5	nu	25AX4	nu
2GK5	u	3DK6	u	4DT6	n	5CM8	n	6AD6	n	6AS7	u	6FM8	u	12AL5	u	12DQ6	u	25BK5	n
2W3	nu	3DT6	nu	4EJ7	u	5CQ8	n	6AD7	n	6AS8	n	6FQ6	u	12AT6	nu	12DT5	u	25BQ6	nu
3AL5	u	3DZ4	u	4HT6	u	5DH8	u	6AE6	n	6AT8	nu	6GA8	u	12AT7	nu	12EG6	u	25CD6	n
3AU6	nu	3ER5	n	4J06	u	5FQ7	u	6AF6	nu	6AU4	u	6GK6	n	12AU7	nu	12EK6	n	25DN6	n
3AV6	n	3GK5	n	5AM8	u	5GX7	u	6AH4	n	6AU5	nu	6GU7	n	12AX7	u	12FX5	n	25W4	n
3B2	u	4AU6	u	5AN8	nu	5J6	n	6AH6	n	6AU8	nu	6HA5	u	12BA7	n	13D7	u	35EH5	u
3BA6	u	4AV6	u	5AQ5	nu	5KE8	n	6AJ5	n	6AV5	u	6HG8	u	12BD6	n	13DR7	u	50EH5	u
3BC5	u	4BN6	u	5AT8	nu	5LJ8	u	6AK6	n	6AW8	nu	6HL7	u	12BF6	n	17AX4	nu		
6BN4	nu	6GQ7	nu	6CU8	nu									ADDITION- 6BD5 n 6CW4 n 12BK6 n					
6BN6	nu	6GC8	n	6CX8	u														
6BQ5	u	6GK4	u	6CY5	u														
6BQ6	nu	6GL6	n	6CY7	u														
6BQ7	nu	6GL8	u	6GZ5	u														
6BW8	n	6GM6	n	6DA4	u														
6BX7	u	6GM7	nu	6DB5	u														
6BY5	nu	6GM8	n	6DE6	u														
6BY6	u	6GN7	u	6DN7	n														
6BY8	u	6GQ8	n	6DQ6	n														
6BZ7	n	6GR6	n	6DT6	u														
6CB5	u	6GS6	nu	6DX6	n														
6CB6	nu	6GZ7	u	6EA7	n														
6CD6	n	6GU6	n	6EA8	u														

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JUNE 1974

THE HORN SPEAKER

Seat of a Famous 1901 Wireless Experiment

It was in this tower that the first wireless signals (the letter "S" in quick succession) were received across the Atlantic. Photograph, posed just after the completion of the test, shows Marconi, standing on the steps of the tower with his two assistants, Messrs. Paget and Kemp; tower keeper at lower right

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